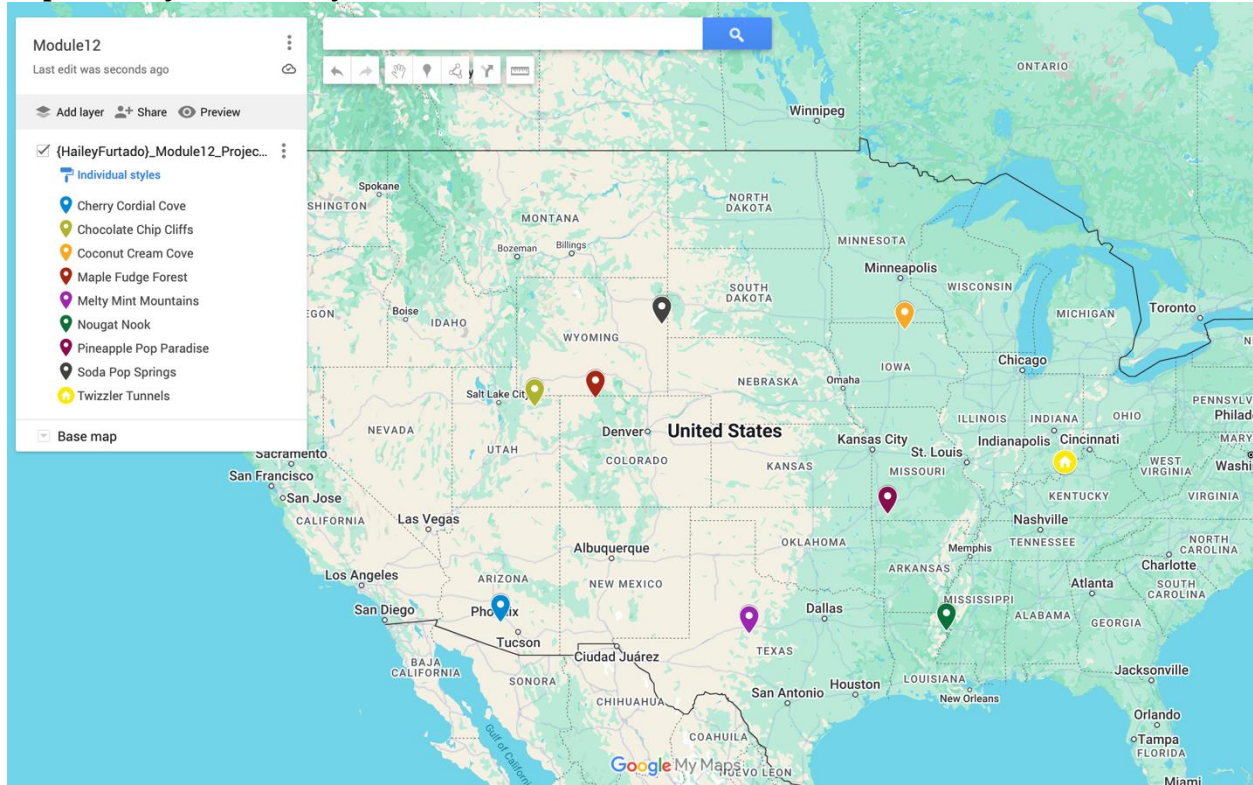


Module 12 – Location Graph

Exploratory Data Analysis



Estimated location of DC

Estimated Location	lat	long
NEW DC	37.76	-101.55

Using average of all the latitudes and longitudes of the current stores to estimate a new DC

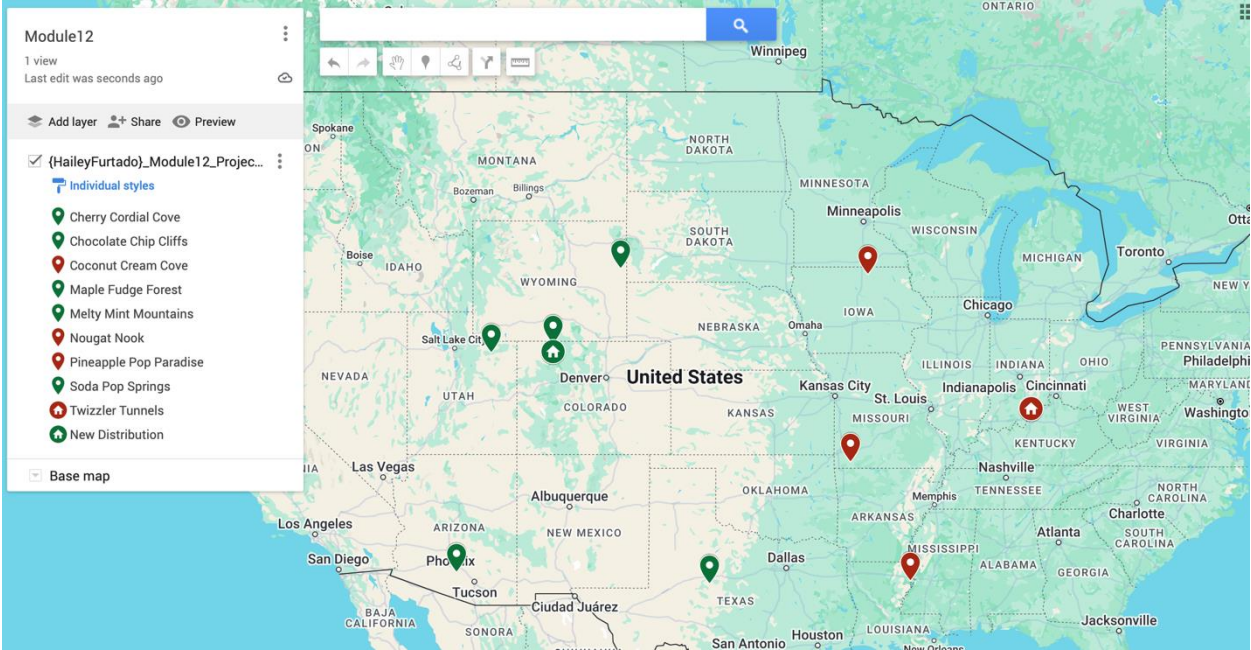
Model Formulation

MIN: $\sqrt{32.62X_1 + -111.83Y_1} + \sqrt{40.6X_2 + -110.25Y_2} + \sqrt{43.27X_3 + -93.13Y_3} + \sqrt{40.91X_4 + -107.43Y_4} + \sqrt{32.19X_5 + -100.33Y_5} + \sqrt{32.3X_6 + -91.19Y_6} + \sqrt{36.74X_7 + -93.89Y_7} + \sqrt{43.45X_8 + -104.37Y_8}$

Model Optimized for Distance Reduction from DC to Store

		Objective		New DC:		LAT	LONG				
		52.7632045				40.6628714	-107.45298				
		Store Location		Current DC		NEW DC		Model Decision			
store_name		lat	long	lat	long	Current DC Distance	Lat	Long	New DC distance	Use New?	Distance
Cherry Cordial Cove		32.62	-111.83	38.66	-85.79	26.73131497	40.6628714	-107.45298	9.156748763	TRUE	9.15674876
Chocolate Chip Cliffs		40.6	-110.25	38.66	-85.79	24.53681316	40.6628714	-107.45298	2.797722271	TRUE	2.79772227
Coconut Cream Cove		43.27	-93.13	38.66	-85.79	8.667623665	40.6628714	-107.45298	14.55833085	FALSE	8.66762367
Maple Fudge Forest		40.91	-107.43	38.66	-85.79	21.75665645	40.6628714	-107.45298	0.248195083	TRUE	0.24819508
Melty Mint Mountains		32.19	-100.33	38.66	-85.79	15.91453738	40.6628714	-107.45298	11.06916687	TRUE	11.0691669
Nougat Nook		32.3	-91.19	38.66	-85.79	8.343236782	40.6628714	-107.45298	18.28721618	FALSE	8.34323678
Pineapple Pop Paradise		36.74	-93.89	38.66	-85.79	8.324445928	40.6628714	-107.45298	14.11890443	FALSE	8.32444593
Soda Pop Springs		43.45	-104.37	38.66	-85.79	19.18750896	40.6628714	-107.45298	4.156065146	TRUE	4.15606515

This model is representing a new distribution center additions to help with the flow of products to the retailers that are in closer distance. The model shows that 5 distribution centers will be using the New DC while 3 will continue to use the current. The map below also highlights which stores will be using each distribution centers. Green are the new locations, while red are the current.



Model with Stipulation

- a. Implement a change that picks a location for the new DC to distance **AND** load. You can do this by multiplying distance by demand if a store is serviced by a particular DC.

			Objective		12525.4609		
			Store Demand		Forecast		
store_name	lat	long	last_year_demand	expected_yoy_change	Next_year_demand	Use New?	
Cherry Cordial Cove	32.62	-111.83	1856.38	-0.08	1744.9972	TRUE	
Chocolate Chip Cliffs	40.6	-110.25	1218.69	0.07	1303.9983	TRUE	TRUE 189.77
Coconut Cream Cove	43.27	-93.13	1327.66	-0.08	1248.0004	FALSE	FALSE 112.31
Maple Fudge Forest	40.91	-107.43	1558.89	-0.1	1403.001	TRUE	77.46
Melty Mint Mountains	32.19	-100.33	1466.36	0.07	1569.0052	TRUE	
Nougat Nook	32.3	-91.19	1803.41	-0.12	1587.0008	FALSE	
Pineapple Pop Paradise	36.74	-93.89	1463.96	0.11	1624.9956	FALSE	
Soda Pop Springs	43.45	-104.37	1838.32	0.07	1967.0024	TRUE	

In this stipulation we can find that the optimal locations did not change and when considering load the distribution centers above will be servicing each of the stores. In this case you should always take into account the amount of demand that is needed because it can easily change your model and which DC's will service each other.